# Current perceptions of the term Clinical Pharmacy and its relationship to Pharmaceutical Care

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## Introduction

The "Clinical Pharmacy" movement is commonly believed to have its origin among a group of students at the University of Michigan in the early 1960s, where Don Francke, the alleged “Father of Clinical Pharmacy”, was teaching[1, 2], although the term "Clinical Pharmacy" appeared in the literature as early as 1952.[3] When David Burkholder, one of Don Francke’s students, finished his degree and moved to the University of Kentucky, he promoted the involvement of pharmacists in clinical decision-making via drug information.[1, 2] The term Clinical Pharmacy was almost immediately adopted in Europe.[4]

Since that time, a series of definitions of Clinical Pharmacy have emerged, and table 1 contains an illustrative collection of definitions originating from the United States and Europe. Although all listed definitions agree that Clinical Pharmacy is concerned with the use of medicines or its effects, there are differences. For example, some authors describe Clinical Pharmacy as a body of knowledge[5], rather than a professional practice that draws on or applies such knowledge, and some definitions describe the aims of Clinical Pharmacy in terms of improving processes (“rational and appropriate use of medicinal products and devices” [6]), while others place emphasis on achieving optimal outcomes for individual patients.[5,7] The term Pharmaceutical Care has been used since 1975[8] , also with different definitions, the most widely cited to date being Hepler and Stand’s “responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient’s quality of life.”[9]

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Both terms have been used to help establish a new field of professional activity that focuses on the therapeutic use of medicines and drug therapy outcomes, as opposed to their development or manufacturing, but it is unclear whether and how the terms differ and whether the distinction should be maintained. For example, Barber suggested in 2001 that the term Pharmaceutical Care placed an emphasis on patient’s subjective rather than objective (scientifically determined) drug therapy needs, but argued that “the future of pharmacy depends on a philosophy that bring(s) together” both.[10] Other authors suggest that the distinction may be related to the setting, arguing that the term ‘clinic’ invites associations with the hospital sector. [11,12] Possibly in response, some countries use the term Pharmaceutical Care primarily or exclusively in the community pharmacy setting. It has been suggested in the early 1990s to abandon the term Clinical Pharmacy, because it is outdated[11], while others call for an unambiguous definition and accurate use of the term in practice.[12]

Compiling the key components and core aims of Clinical Pharmacy and Pharmaceutical Care could facilitate the creation of a global definition of Clinical Pharmacy and clarify its relationship to

Pharmaceutical Care.[13] However, in order to gain support for a common definition, current differences in the definition and use of the term across different countries and health care settings should be considered.[14]

## Aims of the study

The primary aim was therefore to identify current disagreements among pharmacists from different countries and professional backgrounds regarding what the term Clinical Pharmacy encompasses and whether and how it differs from Pharmaceutical Care. To further inform discussions around a harmonised definition of Clinical Pharmacy, a secondary aim was to explore the extent to which pharmacists with an interest in Clinical Pharmacy were willing to accept responsibility for drug therapy outcomes.

## Methods

### Survey development and validation

We drafted a survey targeting potential areas of disagreement around the term Clinical Pharmacy identified by members of an ESCP steering committee on 'The future of Clinical Pharmacy' based on their experience. These potential disagreements included whether Clinical Pharmacy was solely a term to describe a set of professional activities, what the specific activities were, who could provide them in which setting, and to which end, and whether and how it differed from Pharmaceutical Care.

The draft survey was subjected to a 2-round content validation exercise, in which 9 'experts' (selected by virtue of having substantive experience in pharmacy practice and/or academia) from 9 countries (pragmatically selected for geographical spread from countries with representation in ESCP: Sweden, the United Kingdom, the Netherlands, Belgium, Germany, Switzerland, France, Italy and Czech republic)rated each item with respect to its clarity of wording and relevance to informing a harmonised definition of Clinical Pharmacy or Pharmaceutical Care on a 4 point scale (1 = Not relevant, 2 = Unable to assess relevance without item revision, 3 = Relevant but needs minor alteration, 4 = Very relevant and succinct) and were invited to suggest additional items. Items included in the draft survey were revised in light of experts' comments and those items that achieved a median rating of 3 or higher in the second round were included in the survey.

The final survey comprised 7 questions and is provided in the online appendix. Questions 1 to 5 listed a number of (1) professional activities, (2) providers, (3) settings, (4) aims and (5) general

descriptors and asked participants to state their personal opinion as to whether each item constituted (a) 'Clinical Pharmacy only', (b) 'Pharmaceutical Care only', (c) both or (d) neither.

In order to examine to which extent Hepler and Strand's stipulation that pharmacist's patient oriented services should be provided 'responsibly' resonated with participant's attitudes towards their own practice, questions 6 and 7 asked them to state their willingness as pharmacists to accept (a) ethical responsibility, (b) legal responsibility or (c) neither for services necessary to achieve desired outcomes (drug therapy effectiveness, safety, patient centeredness and cost-effectiveness). We distinguished between (6) 'current' and (7) 'ideal' working conditions, respectively, in order to account for the possibility that pharmacists' willingness to accept responsibility may be limited by currently available resources (e.g. time, access to medical notes) or support from their environment (e.g. employers or other health care professionals). For the purposes of this survey, 'ethical responsibility' was defined as a moral obligation to provide necessary services to achieve these outcomes, whereas 'legal responsibility' was defined as legal accountability for a failure to provide necessary services.

## Recruitment of survey participants

An invitation to participate (with 2 reminders) in the online version of the survey was sent out by email in September 2014 to 1,285 individuals from 57 countries, who were either current ESCP members or had registered for one or more ESCP symposia since 2012.

## Outcome measures and data analysis

In order to identify key areas of disagreement around the term Clinical Pharmacy (objective 1), we examined agreement between participants for each item listed in questions 1 to 5 regarding whether it applied to Clinical Pharmacy or not. To this end, participants' scores were dichotomised into (a) 'Clinical Pharmacy only' or 'both' vs (b) 'Pharmaceutical Care only' or 'Neither'. In order to identify key areas of disagreement around the *relationship* between Clinical Pharmacy and Pharmaceutical Care (objective 2), we examined to which extent participants who linked each item to Clinical Pharmacy distinguished between the two terms, i.e. rated that the item applied to Clinical Pharmacy only but not Pharmaceutical Care . For both objectives (1) and (2), 'strong agreement' was defined as 90% or more of respondents opting for either option, 'agreement' as more than 80% but less than 90% opting for either option, and 'disagreement' otherwise.

For items with disagreement regarding whether they applied to Clinical Pharmacy (objective 1), we used logistic regression to investigate whether the following participant characteristics were independently associated with linking the item to Clinical Pharmacy (i.e. responded "Clinical Pharmacy only" or "both" vs "Pharmaceutical Care only" or "Neither"): geographical origin (classified as Europe North, Europe West, Europe East, Europe South, non-European), year of qualification as a

pharmacist (classified as before versus after the year 2000), academic activity (classified as either teaching or conducting research versus no such activity), working in a hospital. We examined univariate associations first. Variables that were significant at the p=0.05 level in univariate analysis were included in a multivariate model. Other variables that did not achieve this level of significance in univariate analysis were retained if their addition to the model altered the point estimates of other variables by 10% or more. In the multivariate model, associations were defined as significant at the p=0.05 level."

In order to examine participants' perception of the relationship between Clinical Pharmacy and Pharmaceutical Care further, we pooled 'CP only', 'PC only' and 'both' ratings across questions at participant level and examined the proportion of participants who fell into each of five groups representing potential relationships between CP and PC (see figure 1). For questions 6 and 7, we considered the proportions of participants willing to accept any form of responsibility, i.e. 'ethical 'or 'legal', and of those willing to accept 'any' and 'legal' responsibility under 'ideal' but not 'current' working conditions, respectively.

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## Ethical issues

All procedures performed were in accordance with the ethical standards of National Health Service research ethics committees and with the 1964 Helsinki declaration and its later amendments. The study did not include patients or other vulnerable groups. Ethical approval was not required.

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# Results

## Survey participants

Table 2 shows that a total of 263 participants from 54 different countries completed the questionnaire (response rate 20.5%). The majority of participants (90.1%) were from Europe and the vast majority of respondents were qualified pharmacists (97.3%). Just over half of respondents (57.4%) had completed their pharmacy training before the year 2000. Just under half of respondents primarily worked in hospital settings (48.7%) and 11.4% primarily worked in community pharmacy settings (11.4%). The majority of respondents had been members of ESCP for one year or longer (60.1%), with 15.2% serving or having previously served on an ESCP committee.

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## Opinions regarding the term Clinical Pharmacy

Figure 2 shows the proportions of participants who linked each item to 'Clinical Pharmacy only', 'Pharmaceutical Care only' or 'both', with the remainder linking the item to 'neither'.

*General understanding of the terms* - There was strong agreement among participants that Clinical Pharmacy referred to a 'scientific discipline' (94.2%) and 'set of professional activities' (93.9%), and agreement for 'professional behaviour' (89.7%), and 'set of professional values or principles' (89.4%).

*Outcomes targeted* - There was strong agreement among participants that Clinical Pharmacy targeted medication safety (95.4%) and effectiveness (95.1%) and agreement that Clinical Pharmacy targeted patient-centeredness (86.0%) and cost-effectiveness (83.5%).

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*Professional activities* - There was strong agreement that the term Clinical Pharmacy accommodated 'drug therapy optimisation at patient level (93.2%)', 'laboratory monitoring of drug therapy (93.5%)' and 'treatment individualisation (93.9%)', and there was agreement that it encompassed 'managing an individual's drug therapy(86.7%)', 'drug therapy optimisation at provider level (87.5%)', 'ensuring accurate drug history and transfer of information(88.2%)', 'informative counselling (87.1%)' and 'compassionate counselling (81.0%)'. However, participants disagreed regarding the remaining activities, with the following proportions of participants *not* linking the following activities to Clinical Pharmacy: 'compounding (71.1%)', 'drug logistics (60.5%)', 'filling a prescription/ dispensing (54.8%)', 'drug administration (42.6%)' and 'public health promotion (43.5%)'.
Table 3 shows that compared to participants from Western European countries, those from Southern European countries were significantly more likely to link 'compounding' (adjusted OR 2.93 [95% CI 1.37, 6.29], p=0.008) to Clinical Pharmacy and those from Southern (adjusted OR 3.21 [95% CI 1.53, 6.74], p=0.001) and Eastern (adjusted OR 2.36 [95% CI 1.08, 5.13], p=0.022) European countries were significantly more likely to link 'drug logistics' to Clinical Pharmacy. Having an academic background was significantly associated with *not* linking 'dispensing' (adjusted OR 0.43 [95% CI 0.24, 0.76], p=0.004), 'compounding' (adjusted OR 0.33 [95% CI 0.20, 0.69], p=0.002), and 'drug logistics' (adjusted OR 0.40 [95% CI 0.22, 0.75], p=0.004) to Clinical Pharmacy, as was working in a hospital with respect to 'drug logistics' (adjusted OR 0.33 [95% CI 0.18, 0.59], p<0.001).

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*Providers* - There was strong agreement that pharmacists could provide Clinical Pharmacy services (97%), and that informal carers (e.g. relatives) could *not* provide such services (93.1%), but

disagreement whether 'other health care professionals' could (74.8% of participants disagreed with this). Compared to participants from Western European countries, those from Southern European countries (adjusted OR 0.36 [95% CI 0.13, 0.98], p=0.045) were significantly less likely to state that non-pharmacist health care professionals could provide Clinical Pharmacy services.

*Setting* - There was strong agreement among participants that Clinical Pharmacy services could be provided in a 'Hospital Ward or outpatient clinic (96.5%)' and in a 'Hospital pharmacy (92.7%)', but disagreement regarding non-hospital settings (a 'physician's practice' was not considered a site for provision of clinical pharmacy services by 24.1%, 'community pharmacy' by 29.3%, a 'patient's home' by 31.7%, and 'any other private or public space' by 45.6% of participants, respectively). Compared to participants from Western European countries, those from Northern European countries (adjusted OR 0.36 [95% CI 0.13, 0.98], p=0.045) were significantly more likely to state that Clinical Pharmacy services could be provided in a physician's practice (adjusted OR 0.36 [95% CI 0.13, 0.98], p=0.045) while participants from Southern European countries were less likely to state that Clinical pharmacy services could be provided in community pharmacies. None of the participant characteristics tested was significantly associated with excluding non-hospital settings as sites for the provision of Clinical Pharmacy services.

## Relationship between Clinical Pharmacy and Pharmaceutical Care

There was disagreement regarding the relationship between the two terms, with less than 80% of participants providing ratings consistent with either of the options A to E illustrated in figure 1. Nevertheless, a majority of participants (76.0%) held that Clinical Pharmacy and Pharmaceutical Care partially overlapped with both also having distinct elements (figure 1, option B). Fewer participants believed that Pharmaceutical Care was part of Clinical Pharmacy (Option E: 11.0%), that Clinical Pharmacy was part of Pharmaceutical Care (Option D: 6.8%), that Clinical Pharmacy and Pharmaceutical Care were synonymous (Option C: 5.7%), and that Clinical Pharmacy and Pharmaceutical Care were completely distinct (Option A: 0.3%) with respect to items included in this survey.

*General understanding of the terms* - Among participants linking each descriptor to Clinical Pharmacy, there was strong agreement that both Clinical Pharmacy and Pharmaceutical Care could be generally described as sets of 'professional activities' (94.9%), 'behaviours' (97.0%), and 'professional values or principles' (95.9%), but there was disagreement as to whether Pharmaceutical Care also constituted a 'scientific discipline (31.7% disagreed with this). Having qualified as a pharmacist in 2000 or later was significantly associated with stating that 'Clinical Pharmacy' but not 'Pharmaceutical Care' constituted a 'scientific discipline'.

*Outcomes targeted* – There was agreement that both Clinical Pharmacy and Pharmaceutical Care targeted medication safety, effectiveness and patient centeredness but disagreement whether Pharmaceutical Care also targeted cost-effectiveness (23.4% disagreed with this). None of the participant characteristics tested was significantly associated with linking cost-effectiveness to 'Clinical Pharmacy' but not 'Pharmaceutical Care'.

*Professional activities* - There was disagreement as to whether 'Pharmaceutical Care' also comprised the following specific activities (% negating this): 'managing an individual's drug therapy , e.g. supporting the patient to take his/her medicines as agreed' (20.2%), 'drug therapy optimisation at patient level, e.g. recommending a certain antibiotic for an individual patient' (33.1%), ensuring accurate drug history and transfer of information (33.6%), 'drug therapy optimisation at provider level, e.g. developing and disseminating a new guideline on antibiotic prescribing' (50.0%), 'treatment individualisation, e.g. via therapeutic drug monitoring and pharmacogenetic testing (50.6%)', and 'laboratory monitoring of drug therapy, e.g. renal function'(56.1%). None of the participant characteristics tested was significantly associated with linking respective activities to 'Clinical Pharmacy' but not 'Pharmaceutical Care'.

*Providers and settings* - There was agreement or strong agreement that Clinical Pharmacy and Pharmaceutical Care did not differ with respect to providers or settings

## Pharmacists' willingness to accept responsibility

Figure 3 shows that under the conditions of their *current* working practice, over 80% of respondents were willing to accept some form of responsibility, with little difference between the four different domains (94.3% safety, 89.7% effectiveness, 87.1% patient-centeredness, 85.1% cost-effectiveness). However, the proportions of participants who were willing to assume *legal* responsibility were much lower: safety (32.7%), effectiveness (17.9%), patient-centeredness (17.1%) and cost-effectiveness (20.3%).

Under *ideal* working conditions, the proportions of participants being willing to assume some form of responsibility increased slightly, but the proportions willing to assume legal responsibility at least doubled (safety: 64.3% , effectiveness: 49.2% , patient-centeredness: 46.2%, cost-effectiveness: 44.0%).

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## Discussion

### Key findings

We found that a panel of 263 pharmacists who had previously attended European Society of Clinical Pharmacy symposia, agreed that the term Clinical Pharmacy encompassed a scientific discipline as well as a set of professional activities, behaviours and values or principles and that the aims of Clinical Pharmacy were to improve medication safety, effectiveness, cost-effectiveness as well as patient-centeredness. Survey participants also agreed that Clinical Pharmacy practice comprised a range of activities at both population and individual patient levels and that Clinical Pharmacy services could be provided by pharmacists but not by informal carers in hospital settings. In contrast, there was disagreement as to whether traditional pharmacy activities (compounding, drug logistics, dispensing), drug administration or public health promotion constituted Clinical Pharmacy activities, where differences in opinion regarding one or more of these items were associated with the presence or absence of an academic background, working in a hospital and geographical residence. There was also disagreement whether non-pharmacist health care professionals could provide Clinical Pharmacy services and whether such services could be provided in non-hospital settings. Approximately three quarters of participants provided ratings that were consistent with Clinical Pharmacy and Pharmaceutical Care partially overlapping, but there was disagreement as to what the distinct elements of Clinical Pharmacy were. Over 80% of survey participants were willing to accept ethical responsibility for processes necessary to achieve desired outcomes. Although less than a third of participants were willing to accept legal responsibility under their current working conditions, under ideal working conditions almost two thirds of participants were willing to accept legal responsibility for medication safety and almost half for effectiveness, patient-centeredness and cost-effectiveness.

### Strengths & Limitations

To our knowledge this is the first survey to identify disagreements regarding the term Clinical Pharmacy and its relationship to Pharmaceutical Care. The face and content validity of the survey was established by an expert panel of experienced ESCP members, who were also invited to suggest additional items, and we therefore believe that the main uncertainties around what constitutes Clinical Pharmacy were covered. Data was collected from pharmacists from a wide range of countries and with diverse professional backgrounds and experience, but a limitation to generalisability is that hospital pharmacists and countries with relatively large numbers of ESCP members were overrepresented. A further limitation is a relatively low response rate of 20%, although we do not think that this substantially compromised the identification of key

disagreements around the term Clinical Pharmacy and its relationship to Pharmaceutical Care, the primary aim of this survey. When asking about pharmacists' willingness to accept ethical or legal responsibility, a limitation is that we did not explicitly distinguish between sole vs co-responsibility, and it is therefore possible that the proportion of pharmacists who were willing to accept some form of ethical or legal responsibility was underestimated. Similarly, the apparent disagreement regarding whether Pharmaceutical Care constitutes a "scientific discipline (e.g. a branch of pharmacy)" might benefit from further exploration as to what constitutes a scientific discipline in the opinion of stakeholders. We have made no attempt to conduct a conceptual analysis to derive the "true" meaning of the term Clinical Pharmacy, because the interpretation of the term "clinical" will be significantly driven by the cultural and political context it is used in. Finally, although defining disagreement using a cut-off of 80% agreement is arbitrary, we hold that it is a meaningful threshold to identify priorities for further discussions around a harmonised understanding of the term Clinical Pharmacy.

## Implications

Our survey has established that there is general agreement among participants that Clinical Pharmacy is a scientific discipline within pharmacy and one area of pharmacy practice that encompasses a range of professional activities to optimise medicines use, and that the aim is to improve clinical as well as humanistic and economic outcomes of drug therapy. These findings are generally consistent with the ESCP describing Clinical Pharmacy as a 'health specialty, which describes […] activities and services […] to […] promote the rational and appropriate use of medicinal products and devices' to achieve 'better health outcomes and a better use of health care resources'.[15] Although ESCP also specifies that Clinical Pharmacy describes activities of 'pharmacists' and clarifies that the word 'clinical' should not be taken to restrict such services to hospitals, there were disagreements among survey participants regarding who could be providers and in which settings.

Additionally, and perhaps most importantly, there was disagreement around whether Clinical Pharmacy also encompassed the more traditional pharmaceutical activities of compounding, dispensing and drug logistics. Given that the term Clinical Pharmacy has originally been coined to support a paradigm shift in the pharmacy profession from manufacturing and distributing drug products to a focus on the therapeutic use of medicines, greater clarity by organisations such as ESCP about how Clinical Pharmacy differs from traditional pharmacy practice, may support the intended function of the term. In addition, our finding that participants' opinions regarding the specific activities captured by Clinical Pharmacy differed by professional background and geographical residence highlights that support for a harmonised definition of Clinical Pharmacy

should be sought from both academics and non-academics, and from both those working in hospital and community settings in all parts of Europe (and beyond).

The term Pharmaceutical Care has been coined to support the same development within the pharmacy profession, but the majority of participants distinguished between the terms with distinct elements for both. However, there was no agreement regarding what the distinct elements were. One commonly mentioned difference relates to the setting of practice, consistent with our finding that almost 20% of respondents considered Clinical Pharmacy an exclusively hospital-based activity while almost 30% held that Pharmaceutical Care was exclusively practiced in community pharmacy. Future definitions should make it explicit, whether or not the practice of Clinical Pharmacy is setting specific. A further potential difference relates to the focus of practice. It could be argued that initially, the focus of Clinical Pharmacy was on process rather than outcome[16], and that a key function of the Pharmaceutical Care concept was to shift the focus from process to patient outcomes.[17] The fact that in their latest definition of Clinical Pharmacy, the American College of Clinical Pharmacy states that "The practice of Clinical Pharmacy embraces the philosophy of Pharmaceutical Care […] for the purpose of ensuring optimal patient outcomes"[7] can be taken as an indication that the term Pharmaceutical Care has succeeded in this respect. Nevertheless, even with this definition, the word "embrace" leaves room for interpretation where (if any) the boundaries between the two terms lie. In response to ongoing debates around the Pharmaceutical Care concept [18], the Pharmaceutical Care Network Europe has recently defined it as 'the pharmacist's contribution to the care of individuals in order to optimise medicines use and improve health outcomes'.[19] Clarifying the relationship between Clinical Pharmacy and Pharmaceutical Care as well as their functions is likely to be mutually beneficial in order to accomplish the paradigm shift within the pharmacy profession that both terms set out to achieve.

A further function of the term Pharmaceutical Care (as defined in 1990[9]) was to promote providers accepting responsibility for drug therapy outcomes. Hepler stated that responsibilities, and not technical functions, should drive the definition of Clinical Pharmacy[20], and theoretical models have been used to fundament the perception of responsibility acquisition by pharmacists providing clinical services.[21] It is therefore noteworthy that common definitions of Clinical Pharmacy and the PCNE definition do not include this notion. However, the progression from providing advice on medicines use to accepting responsibility for patient outcomes may be the next shift in paradigm that the pharmacy profession has yet to accomplish. Our finding that pharmacists' willingness to accept legal responsibility at least doubled under 'ideal' compared to 'current' working conditions, suggests that current working environments are perceived as limiting factors. Further research is

required to better understand barriers and facilitators to pharmacists accepting the optimisation of drug therapy outcomes as their core responsibility as health care professionals.

## Conclusions

The survey demonstrates discrepancies between pharmacists across Europe in their understanding of the term Clinical Pharmacy and its relationship to Pharmaceutical Care. Based on the survey's findings, the main barriers towards a harmonised understanding of the term Clinical Pharmacy relate to who can provide Clinical Pharmacy services in which settings as well as what the specific activities are that differentiate Clinical Pharmacy from traditional pharmacy practice and Pharmaceutical Care. Although ensuring optimal patient outcomes is and continues to be a multidisciplinary task, the responsibilities of pharmacists within clinical teams should become an area of future debate.


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## Conflicts of interest

The authors declare they have no conflicts of interest.

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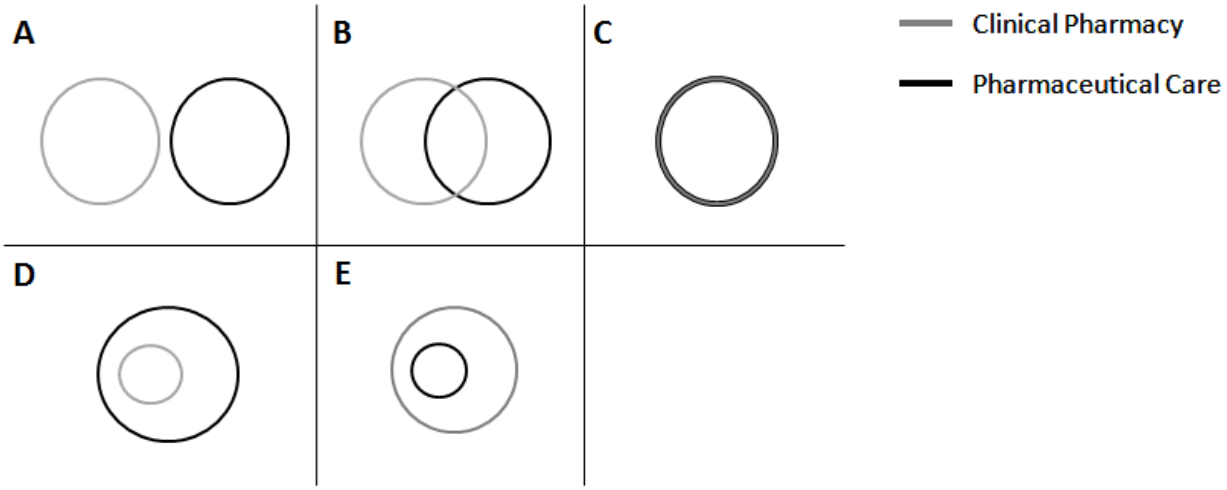
**Figure 1:** Illustration of possible relationships between Clinical Pharmacy and Pharmaceutical Care




A='Clinical Pharmacy (CP)' and 'Pharmaceutical Care (PC)' are completely distinct (reflected by participants rating 'CP only' or 'PC only' for all items); B=CP and PC partially overlap (reflected by participants rating each of 'CP only', 'PC only' and 'both' for one or more items); C=CP and PC completely overlap (reflected by participants who stated 'both' for all items); D=CP is part of PC ( reflected by participants who stated each of 'PC only' and 'both' for one or more items); E=PC is part of CP (reflected by participants who stated each of 'CP only' and 'both' for one or more items)

**Figure 2:** Findings of survey questions targeting participants' understanding of the term Clinical Pharmacy and its relationship to Pharmaceutical Care. For each question, the items are ranked in descending order of the overall proportions of survey participants linking each item to Clinical Pharmacy.

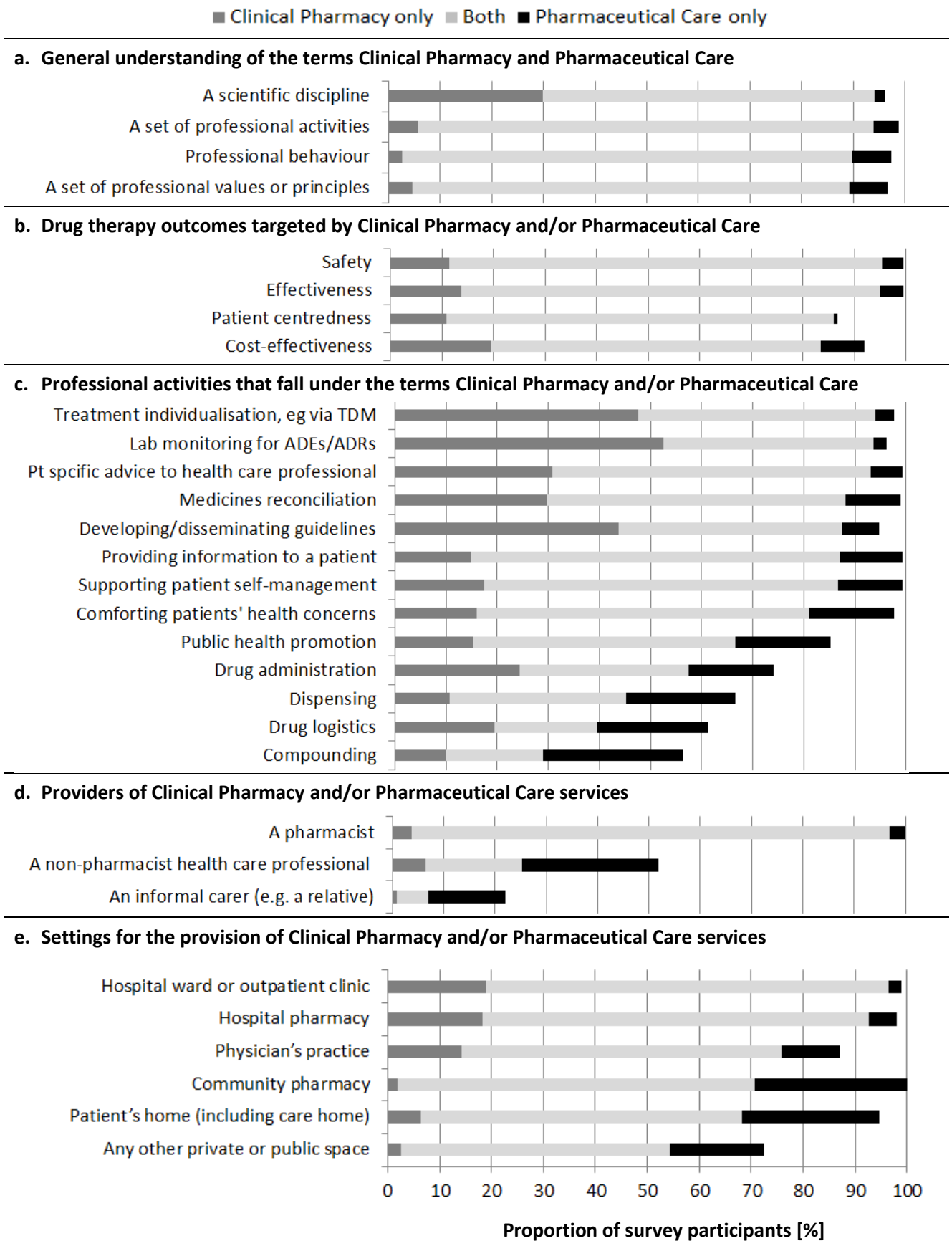


**Figure 3:** Findings of survey questions targeting participants' willingness to accept ethical or legal responsibility for providing the services necessary to achieve different drug therapy outcomes, distinguishing between a) participants' most current and b) ideal working conditions, respectively.

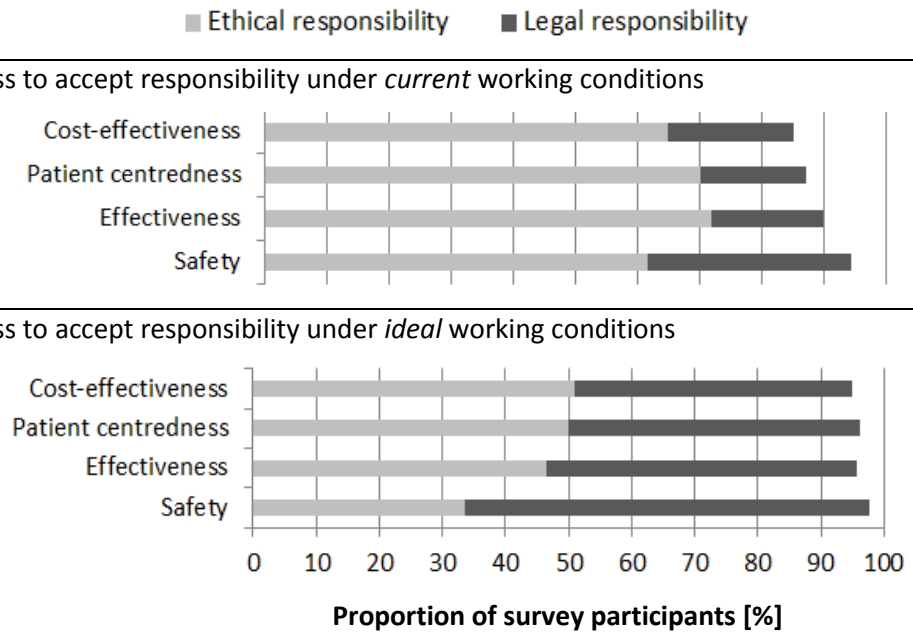


**Table 1.** Illustrative collection of definitions (original or in their English translation) of the term Clinical Pharmacy highlighting apparent commonalities and differences between them

| Author [Year] | Country | Definition | General description | Focus on process vs outcomes | Provider | Setting |
|---|---|---|---|---|---|---|
| Hutchinson, Burkholder [1971][2] | US | The utilization of a pharmacist's drug knowledge as applied to the specific drug problems of an individual patient | Health care practice | Process | Pharmacist | Not specified |
| Traub et al [1979][22] | US | The practice of ensuring that the correct patient received the most appropriate medication and dose for a specific condition, via a rational dosage form and regime, over an appropriate time period; and assisting in the prevention, identification and resolution of untoward effects from these drugs and their interactions; and educating patients with regards to drugs with the intention of limiting these untoward effects and improving compliance. | Health care practice | Process and outcomes | Not specified | Not specified |
| Franklin BD, van Mil JW [2005][6] | US/NL | Clinical Pharmacy is that part of the practice of pharmacy that contributes directly to patient care and develops and promotes the rational and appropriate use of medicinal products and devices. | Health care practice | Process | Pharmacist | Not specified |
| American College of Clinical Pharmacy [2008][7] | US | Clinical Pharmacy is a health science discipline in which pharmacists provide patient care that optimizes medication therapy and promotes health, wellness, and disease prevention. The practice of Clinical Pharmacy embraces the philosophy of Pharmaceutical Care; it blends a caring orientation with specialized therapeutic knowledge, experience, and judgment for the purpose of ensuring optimal patient outcomes. | 'Discipline'; Health care practice | Outcomes | Pharmacist | Not specified |
| European Society of Clinical Pharmacy [15] | Europe | A health specialty, which describes the activities and services of the clinical pharmacist to develop and promote the rational and appropriate use of medicinal products and devices. | Health care practice | Process | Clinical pharmacist | Not specified |
| ABDA/Deutsche Pharmazeutische Gesellschaft [1998][23] | Germany | Clinical Pharmacy is that discipline of Pharmacy, which encompasses the optimisation of medication use for and by patients based on pharmaceutical natural science | 'Discipline' | Process | Not specified | Not specified |

| | | | | | | |
|---|---|---|---|---|---|---|
| United Kingdom Clinical Pharmacy Association (UKCPA)[5] | UK | The term Clinical Pharmacy […] (is) used generally to describe the knowledge, skills and attitudes required by a pharmacist to contribute to patient care. As the delivery of healthcare becomes more dependent upon successful multidisciplinary co-operation, increasingly pharmacists see their contributions in terms of overall patient outcomes. | Body of 'knowledge, skills, attitudes' | Outcomes | Pharmacist | Not specified |
| Belgian Federal Government Working Group on Clinical Pharmacy | Belgium | Clinical pharmacy envisions responsible patient-centered pharmaceutical care and the provision of efficient, effective and safe pharmacotherapy seamlessly assured by a multidisciplinary care team within a global health policy. | Health care practice | Process | Not specified | Not specified |
| Swiss association of Public Health Administration and Hospital Pharmacists (GASA) [2011][24] | Switzerland | Clinical pharmacy is that part of pharmacy that aims to develop and advance the appropriate and efficient use of medicines. In hospitals, the term Clinical Pharmacy is used to describe the patient centred pharmaceutical activities performed in collaboration with other health care professionals. The Clinical Pharmacist has completed specific training and is responsible for his actions. | 'Part of pharmacy'; health care practice | Process | Pharmacist | Not specified |
| Italian society of Clinical Pharmacy[25] | Italy | The scope of Clinical Pharmacy comprises guaranteeing the safe and effective use of medicines by employing clinical pharmacology, counselling, pharmacovigilance, and pharmaceutical technology | Health care practice | Process | Not specified | Not specified |
| French society of Clinical Pharmacy[26] | France | Clinical Pharmacy is the optimal use of pharmacist's pharmaceutical and biomedical judgement and knowledge in order to improve the effectiveness, safety, efficiency and accuracy in the use of medicines and medical devices when treating patients; and this will be achieved using all educational and informative resources, particularly by the use of national and international scientific publications and events. | Health care practice | Process and outcomes | Pharmacist | Not specified |
| Norwegian society of clinical pharmacy [2007][27] | Norway | Clinical pharmacy is the use of pharmaceutical expertise, clinical data and other relevant information to support correct use of drugs in the individual patient. The work is performed by a Master in pharmacy in cooperation with physicians, and possibly other health professionals and patients themselves. | Health care practice | Process | Master in pharmacy (as part of a team) | Not specified |
| Danish society of clinical pharmacy[28] | Denmark | Clinical pharmacy is a profession, which ensures optimal and rational use of medication for the benefit of the patient and society in collaboration | Health care practice | Process and | Pharmacist (as part of | Not specified |

| | | | |
|---|---|---|---|
| | between pharmacists, pharmaconomists, other medication professionals and the patient | outcomes | a team) |

**Table 2:** Participant characteristics (n=263)

| Characteristics | n | % |
|---|---|---|
| **Country of origin** | | |
| Europe West [A] | 116 | 44.1 |
| Europe North[B] | 43 | 16.3 |
| Europe South[C] | 42 | 16.0 |
| Europe East[D] | 36 | 13.7 |
| Other [E] | 26 | 9.9 |
| **Professional background** | | |
| Pharmacy student | 7 | 2.7 |
| Pharmacist | 256 | 97.3 |
| Completed PhD (or equivalent doctorate obtained by research) | 101 | 38.4 |
| Completed Diploma or Master's degree in Clinical Pharmacy awarded by a University | 59 | 22.4 |
| Completed post-graduate specialist training in Clinical pharmacy* | 52 | 19.8 |
| Doctoral student | 36 | 13.7 |
| Other [F] | 24 | 9.1 |
| **Year of pharmacy degree (where applicable)** | | |
| 1960 to 1969 | 5 | 1.9 |
| 1970 to 1979 | 35 | 13.3 |
| 1980 to 1989 | 48 | 18.3 |
| 1990 to 1999 | 63 | 24.0 |
| 2000 to 2005 | 41 | 15.6 |
| 2006 to 2010 | 44 | 16.7 |
| After 2010 | 20 | 7.6 |
| **Places of work** | | |
| Hospital pharmacy | 128 | 48.7 |
| University | 73 | 27.8 |
| Community pharmacy | 30 | 11.4 |
| Governmental organisation | 16 | 6.1 |
| Professional organisation | 16 | 6.1 |
| Two or more | 42 | 16.0 |
| **Professional activities** | | |
| Providing Pharmaceutical Care/Clinical Pharmacy services | 149 | 56.7 |
| Conducting research into Pharmaceutical Care/Clinical Pharmacy | 134 | 51.0 |
| Teaching Pharmaceutical Care/Clinical Pharmacy | 135 | 51.3 |
| Managing Pharmaceutical Care/Clinical Pharmacy services | 81 | 30.8 |
| Other | 22 | 8.4 |
| **Membership in professional organisations** | | |
| European Society of Clinical Pharmacy for 1 year or longer | 158 | 60.1 |
| European Society of Clinical Pharmacy for less than 1 year | 75 | 28.5 |
| Pharmaceutical Care Network Europe (working for an organisation that is a member) | 25 | 9.5 |
| Pharmaceutical Care Network Europe (as an individual member) | 23 | 8.7 |
| Euro Pharm Forum | 17 | 6.5 |
| Other[G] | 66 | 25.1 |

**A** = Austria: 7, Belgium: 14, France: 20, Germany: 13, Ireland: 3, Luxembourg: 1, Netherlands: 19, Northern Ireland: 1, Switzerland: 24, United Kingdom: 14; **B =** Denmark: 18, Finland: 5, Iceland: 2, Norway: 10, Sweden: 8; **C** = (Greece: 4, Italy: 5, Malta: 2, Portugal: 11, Spain: 14, Turkey: 6); **D** = Croatia: 3, Czech Republic: 6, Estonia: 2, Hungary: 1, Letvia: 1, Macedonia: 1, Moldova: 1, Montenegro: 3, Romania: 4, Serbia: 1, Slovakia: 4, Slovenia: 4, Ukraine: 5); **E** = Asia Middle East [Iraq: 2, Israel: 1, Jordan: 1, Palestine: 1, Qatar: 1, Saudi Arabia: 3, UAE: 1]; Asia Far East [China: 1, Indonesia: 2, Japan: 2, Phillipines: 1]; Africa [Algeria: 1, Libya: 1, Morocco: 1, Nigeria: 1, Tunesia: 1]; North America [Canada: 1, USA: 2]; South America [Costa Rica: 1, Sint Maarten: 1]; **F** = Clinical pharmacy resident: 2, Independent Prescriber: 1, MPH or MSc in related discipline (MPH, pharmacology): 4, Pharm.D. (US): 3, Specialisation in hospital pharmacy: 6, Specialisation in pharmaco-economics: 1,University lecturer or professor: 7); G=National society for clinical pharmacy: 22, other academic organisation: 8, other professional organisation: 36

**Table 3:** Questionnaire items with <80% agreement on whether they applied to Clinical Pharmacy and participant characteristics associated with stating the item applied to Clinical Pharmacy. Where two sets of odds ratios are provided for the same item, the upper row includes the univariate and the second row the adjusted odds ratios, respectively.

| **Questionnaire item** (number, proportion of participants stating the item applied to Clinical Pharmacy) | **Participant characteristics** OR and adjusted OR (95% confidence interval) of linking each item to Clinical Pharmacy | | | | | | |
|---|---|---|---|---|---|---|---|
| | Geographical origin (Europe West is reference) | | | | Pharmacy degree after 2000 vs 2000 or earlier | Active in teaching or research vs no such activity | Work in hospital vs other |
| | Europe North | Europe East | Europe South | None-European | | | |
| **Professional activities** | | | | | | | |
| Public health promotion (n=175; 66.5%) | 0.85 (0.42, 1.73) | 1.39 (0.62, 3.10) | 1.53 (0.71, 3.29) | 4.69 (1.33, 16.5) | 0.96 (0.58, 1.62) | 1.08 (0.62, 1.87) | 1.13 (0.68, 1.89) |
| Drug administration (n=112; 42.6%) | 1.07 (0.53, 2.16) | 1.17 (0.55, 2.47) | 1.87 (0.89, 3.90) | 3.11 (1.16, 8.31) | 1.19 (0.72, 1.95) | 0.83 (0.49, 1.42) | 0.86 (0.53, 1.40) |
| Dispensing (n=119; 45.2%) | 0.78 (0.38, 1.61) | 0.94 (0.44, 2.01) | 1.76 (0.86, 3.59) | 1.54 (0.86, 3.62) | 0.90 (0.55, 1.47) | 0.47** (0.28, 0.81) | 0.95 (0.58, 1.54) |
| | Not included | Not included | Not included | Not included | Not included | 0.43** (0.24, 0.76) | 0.75 (0.44, 1.26) |
| Drug logistics (n=104; 39.5%) | 1.72 (0.82, 3.58) | 2.93** (1.36, 6.34) | 4.27** (2.03, 8.98) | 1.64 (0.67, 3.99) | 0.81 (0.49, 1.33) | 0.56** (0.33, 0.95) | 0.41** (0.25, 0.69) |
| | 1.40 (0.69, 2.92) | 2.36** (1.08, 5.13) | 3.21** (1.53, 6.74) | 1.47 (0.58, 3.73) | Not included | 0.40** (0.22, 0.75) | 0.33** (0.18, 0.59) |
| Compounding (n=76; 28.9%) | 0.92 (0.39, 2.15) | 1.73 (0.76, 3.93) | 3.15** (1.49, 6.64) | 1.83 (0.73, 4.59) | 1.05 (0.61, 1.80) | 0.38** (0.22, 0.67) | 1.00 (0.59, 1.71) |
| | 0.90 (0.38, 2.13) | 1.47 (0.64, 3.42) | 2.93** (1.37, 6.29) | 1.86 (0.73, 4.74) | Not included | 0.33** (0.20, 0.69) | Not included |
| **Providers of Clinical Pharmacy and/or Pharmaceutical Care services** | | | | | | | |
| Non-pharmacist HCP (n=66; 25.2%) | 1.56 (0.74, 3.26) | 0.75 (0.31, 1.82) | 0.36* (0.13, 0.98) | 0.63 (0.22, 1.80) | 0.77 (0.44, 1.37) | 1.54 (0.81, 2.91) | 0.78 (0.44, 1.36) |
| | 1.56 (0.74, 3.26) | 0.75 (0.31, 1.82) | 0.36* (0.13, 0.98) | 0.63 (0.22, 1.80) | Not included | Not included | Not included |
| **Settings for the provision of Clinical Pharmacy and/or Pharmaceutical Care services** | | | | | | | |
| Physician's practice (n=200; 75.9%) | 3.40 * (1.12, 10.3) | 0.79 (0.35, 1.80) | 1.70 (0.33, 1.50) | 1.16 (0.43, 3.17) | 0.83 (0.47, 1.45) | 1.21 (0.66, 2.19) | 0.76 (0.43, 1.33) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 3.40 * (1.12, 10.3) | 0.79 (0.35, 1.80) | 1.70 (0.33, 1.50) | 1.16 (0.43, 3.17) | Not included | Not included | Not included |
| Community pharmacy (n=186; 70.7%) | 0.63 (0.29, 1.36) | 0.54 (0.24, 1.20) | 0.45* (0.21, 0.95) | 1.01 (0.37, 2.77) | 0.85 (0.49, 1.45) | 1.03 (0.58, 1.82) | 0.96 (0.57, 1.64) |
| | 0.63 (0.29, 1.36) | 0.54 (0.24, 1.20) | 0.45* (0.21, 0.95) | 1.01 (0.37, 2.77) | Not included | Not included | Not included |
| Patient's home (n=180; 68.3%) | 1.77 (0.77, 4.07) | 0.74 (0.34, 1.60) | 0.76 (0.37, 1.59) | 1.05 (0.42, 2.64) | 0.74 (0.44, 1.25) | 1.51 (0.87, 2.62) | 0.65 (0.39, 1.10) |
| Other private/public space (n=143; 54.4%) | 0.53 (0.25, 1.13) | 1.72 (0.81, 3.67) | 1.64 (0.81, 3.35) | 0.90 (0.38, 2.13) | 0.86 (0.53, 1.40) | 1.13 (0.67, 1.91) | 1.06 (0.65, 1.72) |

Key: *p<0.05; ** p<0.01